

Annex

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- Minutes from the side event “awareness, participation and acceptance in ecosan projects”
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- 10 Recommendations for Action from the Luebeck Symposium on ecological sanitation
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- Technical excursions

Summarised programme

Sunday, 06.04.2003

- 17:00 – 20:00 h Registration
19:00 – 20:00 h Preparatory meeting for chairpersons and co-chairs

Monday, 07.04.2003

- 8:30 – 9:30 h Registration and coffee
9:30 – 11:30 h Greeting and opening session
11:30 – 12:30 h Panel discussion: ecosan – a realistic tool to achieve the Millenium Development Goals.
12:30 – 14:00 h Lunch / press conference
14:00 – 16:20 h Session A: progress, policies and legislation
16:30 – 17:00 h Coffee break
17:00 – 18:50 h Session B: social and economic aspects
19:00 – 21:00 h informal reception

Tuesday, 08.04.2003

- 8:30 – 11:00 h Continuation session B: social and economic aspects
11:00 – 11:20 h Coffee break
11:20 – 13:05 h Session C: rural and peri-urban case studies
13:05 – 13:55 h Lunch
13:55 – 15:30 h Continuation session C: rural and peri-urban case studies
15:30 – 16:00 h Coffee break
16:00 – 19:00 h Parallel sessions D and E
session D: hygiene and environmental assessments
session E: new technological developments and experiments
19:00 – 21:00 h Side event: preparation of recommendations for action

Wednesday, 09.04.2003

- 8:30 – 18:30 h One day ecosan excursions
19:00 – 21:00 h Side event: awareness, participation and acceptance in ecosan projects

Thursday, 10.04.2003

- 8:30 – 10:55 h** Session F: hygienic agro-reuse
- 10:55 – 11:25 h** Coffee break
- 11:25 – 12:55 h** Session G: feasibility studies
- 12:55 – 13:55 h** Lunch
- 13:55 – 15:55 h** Session H: decision making tools
- 15:55 – 16:25 h** Coffee break
- 16:25 – 17:55 h** Continuation session H: decision making tools
- 18:00 h** Side event: IWA – specialist group sustainable sanitation meeting
- 19:00 h** Boat trip and joint conference dinner

Friday, 11.04.2003

- 8:30 – 9:00 h** Hotel check-out etc.
- 9:00 – 11:00 h** Session I: urban case studies
- 11:00 – 11:30 h** Coffee break
- 11:30 – 13:00 h** Continuation session I: urban case studies
- 13:00 – 14:00 h** Panel discussion: recommendations for action

7. - 11.04.2003 Poster exhibition

12. - 19.04.2003 One week ecosan study tour (Germany, Denmark, Sweden)

Minutes from the side event awareness, participation and acceptance in ecosan projects, 2nd ecosan symposium, Lübeck, 09.04.03, 19h00-21h00

Elisabeth-Maria Huba, consultant of GTZ and presenter of the side event, opened the meeting by welcoming every one.

Reasons and objectives

The side event on awareness, participation and acceptance in ecosan projects was organised by the GTZ in the course of the 2nd International Symposium on ecological sanitation. The aim was to embrace the experience of an international range of ecosan-experts in discussing these aspects and to begin to develop conjointly guidelines and tools for the implementation of ecosan-projects.

The starting point for this event was the current lack of information and tools specific to ecosan projects regarding these issues, and the realisation that while many of the approaches used in "classical" sanitation projects could be adapted to some degree, the interdisciplinary nature of ecosan, the reuse aspects and the intended application of the Bellagio-Principles and the HCES of the WSSCC require a wider range and a more specific set of tools.

People should be involved in assessing a range of ecosan options addressing their needs, thus placing, as far as possible, the decision for the type of system they wish to use directly in their hands. In ecosan projects, all stakeholders must be comprehensively informed about the closed-loop ecosan philosophy, the use of the sanitary facilities, and the safe treatment and application of the recyclates with respect to hygiene and the environment.

First experiences revealed, that we often still lack experience as to how we may best plan and implement ecosan-projects in order to ensure their succes. For the promotion of ecosan and the dissemination of the related know how, guidelines and tools are needed to let the concerned stakeholders know about the concept, the wide range of existing technical and organisational ecosan solutions and the hygienically safe treatment and reuse of the recyclates.

Through this side event, all symposium participants interested in these topics, were invited to share their experiences on the development of strategies, approaches and tools to meet the needs of initiators of ecosan-projects, decision-makers and practitioners.

The overall objective of this side event was to reach a consensus regarding an informal cooperation between the participants to work on the topics of awareness and participation in ecosan-projects on an international level (international working group). The group would therefore benefit from lessons learned and best practices all around the world, thus supporting the elaboration of practical oriented guidelines for the implementation of ecosan-projects and the creation of a toolbox, which may help initiators, planners and implementers of ecosan-projects to raise awareness and create demand, to ensure participation of all stakeholders in the planning, design, implementation and monitoring processes and to provide for decisions on an informed basis.

Agenda

The agenda of the side event was short, concentrating on 3 main items:

Presentation of the draft results of a recent short study on the literature available concerning awareness, participation and acceptance in ecosan projects, carried out by Michela Baldi, GTZ, supported by information from several international institutions and organisations working in the ecosan sector.

Brainstorming on open questions related to these issues

Discussion and consensus on how to work together in this field

Summary of the recent short study on literature about awareness, participation and acceptance in ecosan projects, presented by Michela Baldi, GTZ:

The study is the result of a 16-day literature research, both as hard copies available in the GTZ-ecosan office and on internet web pages, using the google search machine and the links mentioned on the GTZ ecosan webpage. Important information has been gathered with the support of international ecosan professionals.

This literature and internet based research has been conducted with the focus on project implementation tools in the water and sanitation sector. Little ecosan-specific material has been found, as the topic is either still too new, or the experiences documented did not go far beyond single case studies. Nevertheless, several socio-cultural tools applied in the conventional water supply and sanitation sector may be adapted to the ecosan concept.

It is recognised that the research conducted is not exhaustive. 114 publications (reports, studies, articles, papers), on acceptance of, and participation in ecosan have been viewed with a focus on publications in English:

- more than 1/3 of the publications related to African experiences,
- about 10% related to European experiences,
- 5 % from Asia
- 5 % from South America
- and about 45 % concerning either the conventional water supply and sanitation sector or the ecosan approach in general

A great number of publications relate to case studies. Older publications on conventional water supply and sanitation lack the ecosan approach; however, they may provide useful more general information on awareness raising and participation. Since 1999, an increasing interest in the socio-cultural aspects of ecosan projects can be seen in the publications.

Most of the publications are addressed to a more restricted circle of experts' than to practitioners.

A wide range of different approaches and methods, both old and new, have been applied in ecosan projects and reported in the literature. These include:

- Bellagio Principles and HCES (Household-Centered Environmental Sanitation approach)
- PHAST (Participatory Hygiene and Sanitation Transformation)
- WASHE (Water, Sanitation and Hygiene Education)
- PRA (Participatory Rural Appraisal)
- SARAR (Self esteem, Associative strength, Resourcefulness, Action planning, Responsibility)

- GRAAP (Groupe de Recherche et d'Appui pour l'Auto-promotion Populaire)
- DDA or DDR (Demand Driven Approach or Demand Driven Response)
- DESAR (Decentralised Sanitation and Reuse system)

Guiding publications about the importance of socio-cultural aspects in ecosan projects are edited by:

- WSSCC / SANDEC (HCES and Bellagio Principles)
- EcoSanRes (guidelines for sanitation promotion and planning as well as socio-anthropological studies on norms and attitudes towards the ecosan approach are in process)
- EAWAG - NOVAQUATIS research project
- Sustainable Urban Water Management, (Swedish national research programme)
- Decentralized Sanitation and Reuse Systems (DESAR) as a social-scientific research project + Wageningen University
- MVULA Trust, South Africa and Aquamor, Zimbabwe
- WaterAid and ESTAMOS, Mozambique
- Mexican NGOs like CECIPROC, ESAC and the TepozEco pilot programme – among others

The study comes to the following conclusions:

- Ecosan-specific guidelines for project planners, professionals and fieldworkers are currently being discussed.
- Ecosan-specific training manuals on awareness raising for community workers do not yet exist.
- Ecosan-adapted toolbox for planners, professionals and fieldworkers do not yet exist.

Therefore the study gives the following recommendations:

- Intensify the cooperation and information exchange among ecosan experts on socio-cultural topics by means of an "international working group" using e-mail dialogue
- Develop a resource package on participatory approaches and communication related to the ecosan concept
- Work out a comprehensive system of guidelines for planners and practitioners concerning awareness raising, participation and acceptance, based on Best Practices in ecosan projects
- Prepare and facilitate an ecosan-adapted toolbox for planners and practitioners

GTZ will continue this study and publish it to an interested audience as a resource kit for further literature research and updating.

Brainstorming on open questions

To get an impression of the degree to which socio-cultural issues influence in a positive or negative way the successful dissemination of ecosan concepts and systems, the participants collected within 5 minutes the following 55 open questions concerning awareness, participation and acceptance in ecosan projects:

- Nr Question
- 1 Is there a need for fertiliser?
 - 2 Strengthened role of local NGOs, who know the situation and the people --- learn from NGOs!
 - 3 How will you convince people that it does not smell?
 - 4 Should we define a north or south focus at the outset?
 - 5 Operation - maintenance - reuse
 - 6 Identify the different target groups
 - 7 What is / are the most appropriate methods for evaluation after implementing an ecosan project?
 - 8 How to promote local production of ecosan toilets (income generation)?
 - 9 How does the promotion of issues for ecosan differ from sanitation in general?
 - 10 Level of community involvement. Are they convinced to use them?
 - 11 Differences between participation process in developing countries and industrialised countries
 - 12 Ecosan specialists might want to promote their system. Are there methods that help decide between different ecosan alternatives?
 - 13 Why do people want a toilet?
 - 14 Over-fertilising through urine application?
 - 15 People need to identify with a technique to accept and do it. What strategies have we in place to ensure the barrier on attitude by both community members and professional are addressed?
 - 16 Is eco-sanitation organic?
 - 17 How to maintain a dry sanitation system as old people?
 - 18 How can user's participation be integrated to improve existing solutions?
 - 19 Why eco-sanitation is more expensive?
 - 20 What is the consequence if a project failed – what to do, how to react?
 - 21 Who in the international or regional frame (champion) is supporting ecosan – particularly political leadership?
 - 22 Elaborate guidelines on how to address the different stakeholders
 - 23 Who should participate?
 - 24 Awareness needs a lot of logistics and tools ... how can the ability for small organisations be enhanced?
 - 25 Accepting urine diversion!
 - 26 Why do we turn us to the poor and not to rich opinion leading people, politicians, and tourists, as pilot users?
 - 27 How to choose technology? (esp. urban)
 - 28 How much cost the maintenance of the system?
 - 29 On child related – have we developed appropriate child-friendly ecosan furniture
 - 30 How to strengthen the financial capacities of the potential consumers regarding the use of ecosan toilets?
 - 31 Is there any other indicator for acceptance than: people are buying the technology?
 - 32 Eating veggies grown with treated shit?
 - 33 How to convince users/consumers that it is safe?
 - 34 Participation guideline for engineers needed
 - 35 No space for “ecosan” systems in urban areas?
 - 36 How can we spread experiences with ecosan as far as possible?
 - 37 Can you handle shit?
 - 38 What if other people laugh at me?
 - 39 During the evaluation and the monitoring what is the best way?
 - 40 An international working group for whom?
 - 41 How can we offer a product, which is so attractive for the poor that no convincing is needed?

- 42 Can we convince architects/engineers/builders to set examples to generate a “trickle down” effect?
- 43 Urine, anyone?
- 44 Cooking on “shit”-gas
- 45 After the implementation (activities) what kind of approach do we need?
- 46 If you want to implement a project what is the best approach you need?
- 47 How long is monitoring needed by outside organisations?
- 48 In some countries in Asia, there needs to be some modification in design of toilet (ecosan) to be acceptable
- 49 Facing faeces?
- 50 Why do people on the ground (users) choose ecosan above pour flush/pit latrine?
- 51 Is the technology completely convincing?
- 52 Is the society ready to participate in toilet design... if they have not done this during the last 40 years?
- 53 If I am aware... do I buy it then?
- 54 What could we do if we have intention to attend ecosan technical training or professional education activities? (BRTC China)
- 55 How do we join ecosan international cooperative projects? (BRTC China)

This variety of open questions concerning different target groups and stake holders addresses at the same time different professions, regions, and cultures, but is at least nothing more than a first impression of the long way to go.

To make the picture even more complex, the participants listed – within one minute - some target groups or stake holders of ecosan projects and approaches. This list is presented below:

- Community
- Municipality
- Central Government
- Opinion leaders
- NGOs
- International Agencies
- Planners
- **Users of fertiliser**
- Farmers
- Product Developers
- Professionals
- Service Providers
- Hospitals
- Real Estate
- Manufactures
- Families
- Women (*of different ages*)
- Men (*of different ages*)
- Children (*different age and gender*)
- Neighbours
- Slum People
- Schools
- Technical Educators

The participants recognised that this is far from being complete. Moreover, each target group or stake holder in a different socio-geographic context may require appropriate methods and tools to raise their awareness, and to encourage their participation in and acceptance of ecosan concepts and systems - another impression of the long way to go. This is another reason, why this work should be done in close cooperation between international ecosan institutions.

The next steps

As a result of this side-event, the participants decided to found an international working group to address the issues of awareness, participation and acceptance in ecosan-projects. The group will work via internet with ideas being exchanged to help in outlining a guideline and establishing a box of tools which ecosan planners and practitioners will be able to draw upon. As a next step, GTZ offers to bring together the know-how of the participants and even more resource persons in order to elaborate a first draft of the guidelines for the implementation of ecosan projects and to fill a toolbox with appropriate tools for awareness raising on, participation in and acceptance of ecosan projects. The participants in the side event agreed that they will share as far and deep as possible their experiences to answer even more open questions in an ongoing informal e-mail exchange, which will be coordinated in the beginning of the process by GTZ.

Time schedule

The draft results of the guidelines and first tools are to be presented up to November 2003.

Elisabeth-Maria Huba closed the meeting, thanking everyone for his or her attendance.

Writing the notes: Elisabeth-Maria Huba, consultant GTZ

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Minutes from the meeting of the IWA specialist group on Sustainable Sanitation in Lübeck April 10th 2003-05-18

1. Ralf Otterpohl, chairman of the Specialist group on Sustainable Sanitation, opened the meeting by welcoming every one.
2. The agenda of the meeting was agreed upon as are given in these minutes.
3. The name of the specialist group. When the group was formed in Berlin in 2001 it was named "Sustainable Sanitation". Ecological Sanitation is meanwhile the internationally most widely used term for the type of sanitation studied and promoted by the "Sustainable Sanitation" group. Therefore, Ralf suggested that the group should change its name to "Specialist group on Ecological Sanitation". This suggestion was agreed on by all attending the meeting.
4. Ralf informed of EcoSan activities within the IWA. He had been asked by IWA managing director Paul Reiter to chair a session on Ecological Sanitation at the IWA Leading Edge Conference in Venice, 2002. This resulted in a request to arrange an IWA session on EcoSan at the 3rd World Water Forum 2003 in Kyoto, Japan. This session was a great success and even attended by the IWA president Prof. Tambo. In total three EcoSan sessions were arranged in Kyoto. The one by IWA and two by EcoSanRes, Sweden. In addition EcoSan presentations were also given in two sessions organised by UNEP and the Japan Toilet Association. In total there were some 350 events at Kyoto, but the three EcoSan Sessions competed successfully for the audience. Videos of the sessions are to be published at www.ecosanres.org.
5. An important future event is the IWA biannual conference in the autumn of 2004 in Marrakech, Morocco. The specialist group is lobbying to have the term Ecological Sanitation included as a specific topic in the overhead call and to have a special session dedicated to Ecological Sanitation. We do not know how successful this will be. Therefore, it is important that the titles of the papers sent in contain the term Ecological Sanitation. This increases the chance of a special dedicated EcoSan session being arranged.
6. The forming of an EcoSan discussion forum on the internet was discussed. It was agreed that presently it is better that we use the existing EcoSan discussion forum of EcoSanRes (join on www.ecosanres.org) instead of forming a new one of our own.
7. Information was given on some neighbouring specialist conferences that might be of interest:
Constructed wetlands, September 2004,
Anaerobic digestion, September 2004, Canada.
8. Ralf plans an IWA handbook on Ecological Sanitation and asked for expression of interest to co-operate via email. The subject line of the email should read "IWA handbook" and details of the subjects that can be covered should be given. He pointed out that it was important that the contributions will be quantitative including design criteria.
9. The website of the group was discussed. Presently, it is located at the Technical University of Hamburg-Harburg. The address is www.tuhh.de/susan. Meanwhile Ralf could reserve the site www.ecosan.org (surprise it was free) that will be used for our IWA group. We are also working on having it linked from the IWA website. You are all invited to send material (NO commercials, please) and links to this websites describing your EcoSan activities. We will include these links on the website.
10. The meeting was closed by Ralf, thanking everyone for their attendance.

Writing the notes: Håkan Jönsson, Co-chair of the specialist group Ecological Sanitation.

Participants of the meeting of the Specialist group on Sustainable Sanitation at Lübeck April 10th 2003

The meeting was attended by approximately 60 persons in total, but some left before signing the attendance sheets.

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10 Recommendations for Action from the Lübeck Symposium on ecological sanitation, April 2003

350 experts from 60 countries met in Luebeck from the 7th to the 11th April 2003, at the 2nd International Symposium on ecological sanitation organised by the GTZ and the IWA.

The World Water and Sanitation Crisis

The problems raised by the decreasing quality and quantity of water resources are becoming increasingly serious. All indicators show that they are getting worse and that we are facing a serious world water crisis, which will affect us all, particularly the poor. They suffer most from this decrease in fresh water resources, and bear the brunt of water related diseases and a damaged environment.

Both central and on-site conventional sanitation systems have proven to be unable to make a significant impact on the dramatic service backlog of nearly half of the worlds population. Moreover, present sanitation systems are coming under increasing criticism as in many cases they are unaffordable or do not function properly. Indeed, they are using surface and groundwater as a sink for human excreta and wastewater resulting in increasing health hazards, environmental pollution, steady degradation of natural resources and a permanent loss of nutrients and organics from the soil sphere. Instead of solving the problem they often contribute to the contamination of freshwater and increase the scarcity of freshwater resources.

Need for a paradigm shift

To the participants of the Luebeck Symposium it is clear that in order to achieve the Millennium Development Goals and the Johannesburg Plan of Implementation, a new paradigm is required in sanitation, based on ecosystem approaches and the closure of material flow cycles rather than on linear, expensive and energy intensive end-of-pipe technologies. This paradigm must recognise human excreta and water from households not as a waste but as a resource that should be made available for reuse.

The new paradigm is called ecosan

Ecological sanitation (ecosan) is a holistic approach to sanitation and water management based on the systematic closure of local material flow-cycles. Ecosan introduces the concept of sustainability to sanitation.

One of the objectives of the five-day symposium was to formulate priority actions for the further promotion and up-scaling of ecosan.

The participants agreed on the following 10 Luebeck Recommendations:

1. Promote ecosan-systems as preferred solutions in rural and peri-urban areas

A variety of ecosan solutions, ranging from low to high-tech, exist for rural and low-density urban areas. These should now be implemented on a large scale, in accordance with local physical, cultural and socio-economic conditions.

Principles and objectives of ecosan

The basic principle of ecosan is to close the loop between sanitation and agriculture. The main objectives are to:

- reduce the health risks related to sanitation, contaminated water and waste
- prevent the pollution of surface and ground water
- prevent the degradation of soil fertility
- optimise the management of nutrients and water resources.

Closing the loop enables the recovery of organics, nutrients, trace elements and energy contained in household wastewater and organic waste and their subsequent reuse in agriculture. In order not to compromise health in ecosan approaches appropriate treatment and handling must be ensured. In making the organics, nutrients and trace elements available to agriculture, soil fertility is preserved and long-term food security is safeguarded. In practice the commonly applied ecosan strategy of separately collecting and treating faeces, urine and greywater minimises the consumption of valuable drinking water and enables treatment of the separate wastewater flows at low cost for subsequent reuse in soil amelioration, as fertiliser, as service or irrigation water or for groundwater recharge. Rainwater harvesting and the treatment of animal manure may also be integrated into ecosan concepts.

Ecosan can therefore greatly help in saving limited resources. This is particularly urgent with regard to fresh water and mineral resources – for example current estimates for phosphorus state that economically extractable reserves will be exhausted within the next 100 years. Ecosan does not favour a particular technology but is rather a philosophy in recycling oriented resource management and offers modern, convenient, gender friendly and desirable solutions, in accordance with the Bellagio Principles as formulated by the WSSCC (Water Supply and Sanitation Collaborative Council).

Technologies based on ecosan principles should be vigorously promoted for all new construction of buildings and for the refurbishment of older structures wherever feasible. Additionally, existing on-site sanitation facilities that pose a significant health risk should be upgraded in accordance with ecosan principles.

2. **Accelerate large-scale applications of ecosan principles in urban areas**

Urban areas with their rapidly growing populations are in greatest need of sustainable sanitation. Although initial experiences with ecosan systems are available from urban areas, further research and development is urgently required. Further ecosan pilot-projects should be carried out in order to develop a variety of technological, organisational and economically viable solutions for densely populated urban areas and to obtain results concerning the costs and performances of different systems in both industrialised and developing nations. The conversion of existing conventional systems towards ecosan should, wherever possible, be immediately started, adopting if necessary a step-wise approach.

3. **Promote agricultural use**

Ecosan systems are not complete until the fertiliser products are reused. The promotion of agricultural reuse must therefore be a key element of every ecosan project. Reuse options for ecosan fertilisers need urgent field testing at medium and large scale, and appropriate pretreatment, distribution, marketing strategies and guidelines for safe handling and use for different local conditions must be developed. Particular care has to be taken to ensure that the pathogen cycle is broken.

4. **Raise awareness and create demand**

To be willing to make a change, politicians, local and regional authorities and the public need to know that the current system can cause many problems and that the application of ecosan principles can solve several of them. Advocacy and lobbying is therefore essential. There is also an urgent need to showcase ecosan systems at a municipal or large neighbourhood level in order to convince decision makers ("seeing is believing").

5. **Ensure participation of all stakeholders in the planning, design, implementation and monitoring processes**

Planning with a household or neighbourhood-centred approach should be adopted as it places the user at the core of the planning process. The Household Centered Environmental Sanitation Approach (HCES, as developed by the WSSCC) responds to the knowledge, needs and demands of the users. This approach attempts to avoid the problems resulting from either "top-down" or "bottom-up" approaches, by employing both within an integrated framework. Gender issues must be given particular consideration in all processes.

6. **Provide for decisions on an informed basis**

People should be involved in assessing a range of ecosan options addressing their needs, thus placing, as far as possible, the decision for the type of system they wish to use directly in their hands. In ecosan projects, all stakeholders must be comprehensively informed about the closed-loop ecosan philosophy, the use of the sanitary facilities,

and the safe treatment and application of the recyclates with respect to hygiene and the environment. Study and documentation of the health risks posed by the different sanitary concepts, and the necessary means to overcome these, is required.

7. **Promote education and training for ecosan**

Ecosan is multidisciplinary and should be integrated in the teaching curricula of universities, schools and vocational training centres. The engineers, architects, farmers, developers, constructors, consultants, municipal planners, economists and authorities concerned should know about the concept, the wide range of existing technical and organisational ecosan solutions and the hygienically safe treatment and reuse of the recyclates. Ecosan principles should be integrated into capacity building and continuous learning programmes for all the actors involved.

8. **Adapt the regulatory framework where appropriate**

The documentation and results of pilot-projects must be transformed into, among others, technical, socio-economic, and reuse guidelines reflecting the interdependencies of water supply, sanitation, waste management, health, hygiene, environment, agriculture and energy supply. Ecosan technologies should be codified into the local, national and international systems of technical standards and norms in order to provide reference for Best Practice and Best Available Technology. The regulatory framework should be verified or adjusted with the aim of authorising and promoting a closed loop with new innovative technologies and management concepts.

9. **Finance ecosan**

Appropriate financing instruments need to be developed, putting particular emphasis on the possibility to finance the users investment for on-site and neighbourhood systems, recognising that ecosan systems have a different cost structure from conventional sanitation systems. Innovative financing alternatives including start-up funds, community based finance programmes and cost recovery mechanisms may be required. The possibilities for private sector participation are large and should be stimulated, thus opening opportunities particularly for small and medium-sized enterprises and job creation. Additional financing should also be provided to secure research activities.

10. **Apply ecosan principles to international and national Action Plans and Guidelines**

Ecosan strategies should be implemented in national and international action plans including the Implementation Plans for the MDGs (Millennium Development Goals), PRSPs (Poverty Reduction Strategy Papers) and the National Plans of Action within the UNEP GPA (Global Programme of Action for the Protection of the Marine Environment from Land-based Activities). The indicator system for safe and sustainable sanitation provision should be revised to reflect the real risks and dangers to the environment and public health posed by all forms of sanitation.

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Luebeck Recommendations for Action in English, German, French and Spanish to be found at: www.gtz.de/ecosan

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Technical excursions

2nd International Symposium on ecological sanitation
Information for the Excursion on Wednesday 9. April
"ecosan - closing the loop"

Tour A / 1
 Composting toilets, greywater treatment
 and agricultural biogas plant

Ecological village Hamburg Braamwisch with composting toilets and constructed wetlands for greywater treatment



This ecological village was built between 1996 and 2000 in the northeast from Hamburg. The estate area consists of 40 living units in town houses and twin houses.

Each house carries 40 m² solar collectors. Furthermore 50 m² photovoltaic cell modules are installed on each row of five town houses. The "wohnhof braamwisch" with its ten town houses and 400 m² solar collectors is part of the short distance heating grid system of the Hamburg Gasworks, called "Solarprojekt Karlshöhe". All together 124 accommodation units are connected to that grid.

86 roofs facing south carry solar collectors of a 3.000 m² area. The produced heat is collected in the short-distance heating grid system and stored in an underground heat accumulator of 4.500 m³ volume.



The remaining roof area beneath the solar collectors has been used for a grid-connected solar photovoltaic system to produce regenerative electricity. The system occupies 50 m² and produces 4.000 kWh every year. The electricity is feed into the public grid.



All houses are low energy houses with composting toilets or toilets who use rainwater. Constructed wetlands are for greywater treatment.

Meeting Point: Parking place beside the MuK

Departure: 8.15 am

Ticket color:

Farm-Scale Biogas Plant in Behlendorf



This plant with a digester made of concrete (Volume 400 m³) was built in summer 1998.



The manure of pigs, piglets and other organic substrates - so-called cofarmers are digested in this plant.

The owner started with a Combined Heat and Power Unit (CHPU) of 45 kW electrical and 90 kW (thermal) power. The plant is upgraded to 75 kW electrical power.

The biogas produced by the digestion process is collected in a flexible PE gas store. The gas is used in a gas engine that produces 600.000 kWh per year. The farmer uses on his own 60.000 kWh per year. The rest of the produced electricity is feeded in the public grid.



Technical Data:

V _{Sumps}	=	600 m ³
V _{Digester}	=	400 m ³
V _{Manure storage tank}	=	1.200 m ³
Temp.:		37°C to 38°C
CHPU:		75 kW _{el}

Tour Topics:

- composting toilets
- greywater treatment in constructed wetland
- short-distance heating grid system
- farm scale biogas plant



2nd International Symposium on ecological sanitation

Information for the Excursion on Wednesday 9. April

"ecosan - closing the loop"

Tour A / 2
Composting toilets, greywater treatment and agricultural biogas plant

Farm-Scale Biogas Plant in Bornhöved



This plant was built in 2001. Biogas is produced by the digestion of manure and biowaste. The gas is used in a gas engine (CHPU) for the production of heat and electricity.

The manure of approx. 4.000 piglets is collected in two manure storage tanks. From this tanks the digester is fed by a pump. The digester is a gaslight completely sealed tank made of stainless steel (Volume 771 m³)

The mesophilic digestion process operates at 37 °C. An agitator is mixing the digester's contents. The average hydraulic retention time of the manure inside the digester is – depending on the substrate – between 20 and 40 days. Output is biogas and digested substrate



The biogas is stored in a gas storage tank above the digester. The gas engine is fed from the storage tank. The heat produced is used for heating the digester, the stables and the farm house.



The latter is stored in a lagoon of 2.000 m³. It will be used as a fertilizer because of its high ammonia concentration.

Technical Data:	
V _{Biogas Digester}	= 771 m ³
H _{Digester}	= 5,03 m
D _{Digester}	= 13,97 m
Temp.:	37° C
CHPU:	180 kW

Residential area Hamburg Allermöhe with different ecological buildings, composting toilets and reed-bed purification system



Located 15 km southeast of the city center of Hamburg. The history of planning and the development goes back into the 1970's. The first houses were occupied in 1985 – the last one in 1996.

The housing estate consists 34 houses, which were built in semi-detached and terraced formats and is grouped into three yards (north yard, central yard and south yard). 114 people live on the estate.

Different ecological innovations represent the path of ecological engineering development as there are photovoltaic systems, green roofs, rain water harvesting.




Composting toilets are installed in each house. Reed-bed purification system is used for greywater treatment. 1994 – the purification system was upgraded for 140 people and a volume of 15 m³ sewage per day. The area of the constructed wetland is approx. 240 m².

Tour Topics:

- farm scale biogas plant
- green roofs
- composting toilets
- reed-bed purification system

Das Institut für Technische Zusammenarbeit (ITZ) e.V.

International Water Association

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2nd International Symposium on ecological sanitation

Information for the Excursion on Wednesday 9. April

"ecosan - closing the loop"

Wasser Berlin

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Water and Wastewater**

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WASSER BERLIN
International and national conferences,
symposia, seminars

Brief Description

WATER BERLIN is the international Trade Show and Conference for the Water Industry. The event runs parallel to GAS BERLIN. The conference features discussion forums with international experts on a variety of water-related topics. It is a capital investment exhibition for international water supply and is an ideal interface for theory and practice.

Conference participants and visitor Target groups

Water experts from government and industry, engineers, experts in civil engineering, well drilling, waterworks construction, representatives from domestic and international organisations, purchasers, water management experts, scientists, representatives of industry associations and institutions, government officials, high-level administrators.

GAS BERLIN

Gas is a major component of modern energy concepts: it is economical, ecological, and reliable. Investor interest in gas technology reflects the dynamic growth of the industry - and this trend is not limited to western Europe. In fact, rapid economic development has triggered latent demand in central and eastern Europe. This trend is expected continue in the future.

Target Groups

Specialists from private and government suppliers, gas technology suppliers, engineers and buyers, as well as other specialists and commercial enterprises, city administrators and trade associations with a special interest in gas technology.

Meeting Point: Parking place beside the MuK

Departure: 7.30 am

Ticket color:

Messe Berlin

WASSER BERLIN
International and national conferences,
symposia, seminars

- Conference WASSER BERLIN
- IWA- International Water Association Conference
- DVGW / ATV-DVWK / FIGAWA Conference "IT-Gas, Water, Wastewater"
- IOA- International Ozone Symposium
- FIGAWA / DVGW 3rd Well Construction

**Tour includes only transport
Entrance fee: 20 € / person
excluding session fees**

further information and the detailed program are available at the reception !

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2nd International Symposium on ecological sanitation

Information for the Excursion on Wednesday 9. April

"ecosan - closing the loop"

Tour B

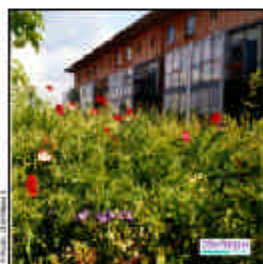
Source separation in a dwelling area, composting toilets, greywater treatment

Meeting Point: Parking place beside the MuK

Departure: 7.45 am (Bus 1) / 9.45 am (Bus 2)

Ticket color: 1 2

Separating Wastewater Treatment System: The Ecological Housing Estate Lübeck-Flintenbreite



The housing estate: In an area of 3.5 ha you will find 117 houses (twin houses and terraced houses) and flats with approximately 300 to 350 inhabitants when the construction of the whole housing estate will be finished.

The "Flintenbreite" is located in Lübeck in the middle of an existing residential quarter. At the moment 30 houses and flats have been build up, the technical equipment for the supply for all 117 planned units is in operation.

The separating wastewater concept: By the use of VACUUM TOILETS with a very low water consumption, (0.7 - 1.0 l per flush) the faeces and the urine (BLACKWATER) are transported in a vacuum pipe system. The BIOWASTE from the kitchen will be mixed and treated together with the blackwater in a DIGESTOR after a thermic hygienisation. The fertilizer can be used in farmland.



The GREYWATER (wastewater from kitchen and bathroom) is collected in gravity pipes and treated in several CONSTRUCTED WETLANDS that are situated in the housing area. The stormwater of roofs and sealed areas is collected in small gutters on the surface of the ground and afterwards it is infiltrated in decentralized SWALES.

Ecological village Hamburg Braamwisch with composting toilets and constructed wetlands for greywater treatment



This ecological village was built between 1996 and 2000 in the northeast from Hamburg. The estate area consists of 40 living units in town houses and twin houses.

Each house carries 40 m² solar collectors. Furthermore 50 m² photovoltaic cell modules are installed on each row of five town houses. The "wohnhof braamwisch" with its ten town houses and 400 m² solar collectors is part of the short distance heating grid system of the Hamburg Gasworks, called "Solarprojekt Karlshöhe". All together 124 accommodation units are connected to that grid. 86 roofs facing south carry solar collectors of a 3.000 m² area. The produced heat is collected in the short-distance heating grid system and stored in an underground heat accumulator of 4.500 m³ volume. The remaining roof area beneath the solar collectors has been used for a grid-connected solar photovoltaic system to produce regenerative electricity. The system occupies 50 m² and produces 4.000 kWh every year. The electricity is feed into the public grid.



All houses are low energy houses with composting toilets or toilets who use rainwater. Constructed wetlands are for greywater treatment.

Tour topics:

- vacuum toilet, waterless urinals
- composting toilets
- anaerobic treatment in a digester
- greywater treatment in constructed wetland
- short-distance heating grid system

2nd International Symposium on ecological sanitation

Information for the Excursion on Wednesday 9. April


"ecosan - closing the loop"

Tour C

Source separation in a dwelling area and agricultural biogas plant


Farm-Scale Biogas Plant in Behlendorf

This biogas plant is located in Behlendorf 20 km south of Lübeck - a small village nearby Ratzeburg.



Exterior view of the biogas plant

This plant with a digester made of concrete (Volume 400 m³) was built in summer 1998.




Interior view of the digester

The manure of pigs, piglets and other organic substrates - so-called cofements are digested in this plant.

The owner started with a Combined Heat and Power Unit (CHPU) of 45 kW electrical and 80 kW (thermal) power. The plant is upgraded to 75 kW electrical power.

The biogas produced by the digestion process is collected in a flexible PE gas store. The gas is used in a gas engine that produces 600.000 kWh per year. The farmer uses on his own 80.000 kWh per year. The rest of the produced electricity is feeded in the public grid.



Gas engine

Technical Data:


V _{Slurp}	=	600 m ³
V _{Digester}	=	400 m ³
V _{Manure storage tank}	=	1.200 m ³
Temp.:		37°C to 38°C
CHPU:		75 kW _{el}

Meeting Point: Parking place beside the MuK

Departure: 9.15 am

Ticket color:

Separating Wastewater Treatment System: The Ecological Housing Estate Lübeck-Flintenbreite




Housing estate building

The housing estate: In an area of 3,5 ha you will find 117 houses (twin houses and terraced houses) and flats with approximately 300 to 350 inhabitants when the construction of the whole housing estate will be finished.

The "Flintenbreite" is located in Lübeck in the middle of an existing residential quarter. At the moment 30 houses and flats have been build up, the technical equipment for the supply for all 117 planned units is in operation.

The separating wastewater concept: By the use of VACUUM TOILETS with a very low water consumption. (0,7 - 1,0 l per flush) the feces and the urine (BLACKWATER) are transported in a vacuum pipe system. The BIOWASTE from the kitchen will be mixed and treated together with the blackwater in a DIGESTOR after a thermic hygienisation. The fertilizer can be used in farmland.



Vacuum toilet

The GREYWATER (wastewater from kitchen and bathroom) is collected in gravity pipes and treated in several CONSTRUCTED WETLANDS that are situated in the housing area. The stormwater of roofs and sealed areas is collected in small gutters on the surface of the ground and afterwards it is infiltrated in decentralized SWALES.

Tour Topics:

- farm scale biogas plant
- vacuum toilets, waterless urinals
- anaerobic treatment in a digester
- greywater treatment in constructed wetland

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

International Water Association

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2nd International Symposium on ecological sanitation

Information for the Excursion on Wednesday 9. April

"ecosan - closing the loop"

Tour D / 1
Small treatment plants for rural areas


Self-sufficient water, wastewater and energy system for a rest area at the motorway A20:



An on-site well supplies the rest area with water. Before the water is offered it will be processed to achieve drinking water quality. The wastewater is treated in a vertical flow constructed wetland (called "subterra plant", 150 sqm) that treats the used water. The outflow discharges in the drainage system of the motorway.

The electrical control of the treatment plant gets the power from regenerative energy production like a photovoltaic generator and a thermal solar collector, by a windmill and a "bio"-diesel engine.

Constructed wetland in Duckwitz Castle




The vertical flow constructed wetland treats the wastewater of 23 inhabitants.

The system is the same as for the rest area at the motorway. The difference is the source of the wastewater: two flats, some flats for holiday guests, one office and a riding facility.

For retention of stormwater a green roof is installed on one shelter.

Sludge treatment in constructed wetlands in Niegleve/Lalendorf



The wastewater of 1.000 total number of inhabitants and population equivalents is treated in an activated sludge plant.

For dewatering the sewage sludge is treated in a constructed wetland.

The sludge is pumped onto the reed bed for a periode of 5 to 10 years. After fulfilling the dumping stops and a further dewatering takes place. Afterwards the polder will be emptied and the dumping starts again.

The constructed wetlands get in operation in 1998. You will receive a report on the experiences made during the last years.

Tour topics:

- constructed wetlands in various sizes for the wastewater treatment
- regenerative energy plants (e.g. photovoltaic and solarthermic plant, windmill ...) as energy supply
- constructed wetland for sludge treatment
- green roofs

Geotechnische Zeitschrift für
Terra und Umwelt (gtz) 1/03 4

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Tour D / 2
Small treatment plants for rural areas

Constructed wetland as secondary clarifier after wastewater treatment in a pond in Goosefeld



D. Schmalz, IWT
Constructed wetland in Goosefeld

The wastewater of the village Goosefeld (combined sewer system) is treated in a non aerated 20 year old pond system. To enlarge the capacity of the treatment plant (from 600 to 1000 on total number of inhabitants and population equivalents) a constructed wetland is added as a secondary clarifier. The constructed wetland should also reduce the phosphorous and nitrogen concentrations. The size of the constructed wetland is 3000 sqm. The hydraulic load from the combined sewer system is 260.000 m³, that discharges in 6 separated fields.

The distribution of the wastewater from the pond and the treatment don't need any energy supply.



Photo: G. Schmalz

Meeting Point: Parking place beside the MuK

Departure: 9.45 am

Ticket color:

Ecological settlement Kiel Hassee with composting toilets and greywater treatment in constructed wetlands



Concrete building with green roofs, Kiel Hassee



Photo: G. Schmalz
Composting toilet

In Kiel Hassee 20 flats and houses have been build up. The first families moved in in 1992. It was one of the first housing areas where composting toilets have been installed in an urban area (Kiel:220.000 inhabitants). The remaining greywater is treated in constructed wetlands, the cleaned wastewater discharges in an surface water. Measurements have shown that outgoing concentrations are lower than in conventional wastewater treatment plants.

Tour Topics:

- constructed wetland as secondary clarifier for 1000 inhabitants
- composting toilets in a residential area
- greywater treatment in constructed wetlands
- green roofs for stormwater retention









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